

REMARKS

In the June 15, 2006 Office Action, claims 11-51 were rejected over two cited references. This Response cancels, amends and adds new claims: Claims 11-21 and 23-25 are now canceled, Claims 52–59 are newly added, and Claims 22, 26-31, 35, 37-44, 49 and 51 are amended. After entry of the foregoing amendments, Claims 22 and 26 – 59, comprising a total of 35 claims: 4 independent claims and 31 dependent claims remain pending in the application. Reconsideration of the application is respectfully requested in view of the above amendments and the following remarks.

DISCUSSION

Applicant appreciates the Examiner's review of the art and his citation of the combination of the Ryang and Mehring references.

While Applicant appreciates that a combination of references is being cited, a review initially of each individual reference may highlight the differences between the teachings or suggestions in these references as compared to Applicant's claimed subject matter. These differences are important under a *Graham v John Deere* analysis. MPEP § 2141 (differences between cited art and claimed invention are to be determined). Accordingly, Applicant examines each reference individually and then considers the combination and what it might teach or suggest to a person of ordinary skill in the chemical polymer-related arts.

The Ryang et al Patent

Ryang states in the Summary of the Invention section that the invention is of a polymer product obtained from a mixture of a polymerization material and a polycondensation product of a partially hydrolyzed chelated metal oxide precursor. In one embodiment, contact is between the polymerization material and a metal oxide sol that includes a polycondensation product and a liquid. The polycondensed partially hydrolyzed chelated metal oxide precursors are incorporated into the polymer on a molecular level, and are not present as particulates. The polycondensed partially hydrolyzed chelated metal oxide precursors are said to be present in micro-clusters having an average size in the range less than about 10 nm, preferably less than 5 nm and more preferably less than 2 nm.

The Ryang patent does not teach or suggest, however, the partially hydrolyzed phosphinate –chelated metal oxide precursors and how to use these with a polymer material to make a flame retardant polymer.

The Mehring reference

The Mehring article deals with chemical coupling agents and mentions well-known coupling agents such as the organo alkoxy silanes. Mehring indicates that he is “investigating the potentialities of organophosphorous compounds as coupling molecules.” The aim appears to be to develop coupling agents to improve or develop new hybrid materials. Hybrid materials are defined as those that include an organic component (such as a polymer) coupled (via a coupling agent) to an inorganic component (such as silica particles). The article does not deal with the adding of partially hydrolyzed phosphinate –chelated metal oxide precursors to a polymer material to make a flame retardant polymer. It does not address flame retardation at all, but is solely concerned with coupling agents under development. In the patent application, the phosphorous is described as dispersed throughout the polymer making it flame retardant. The claimed inventions are not primarily concerned with adding inorganic materials to polymers and with coupling agents, although additives may be added to polymers of the invention, as set forth in the patent application, and an incidental benefit may be obtained. Rather, the primary significance of the phosphate-containing polycondensation product within the polymers of the present inventions is flame retardation.

The Combination of Ryang and Mehring

The combination adds the teachings of Mehring to the primary Ryang reference. Thus, Ryang in view of Mehring as a combination may teach or suggest that the process of making a coupling agent that contains an organophosphate is obvious. The combination might also teach or suggest adding such a coupling agent to a polymer for purposes of acting as a coupling agent. However, the combination does not teach producing a polymer having flame retardant properties by incorporation throughout the polymer of well dispersed partially hydrolyzed phosphinate –chelated metal oxide sol. The combination does not teach the average size range of such sol clusters, nor does it teach the concentration of partially hydrolyzed phosphinate –chelated metal oxide sol necessary for effective flame retardation. As explained below, some of

these features are incorporated into each of the independent claims, and hence their respective dependent claims. Accordingly, as addressed in detail here below, the pending claims are patentably distinct from the combination due to these differences. See, *Graham v. John Deere* MPEP § 2141 (differences between cited art and claimed invention are to be determined)

The Claims are Patentable, as Now Presented

Applicant will, for the sake of brevity, only address the pending independent claims on the understanding that the dependent claims each incorporate the limitations of their respective independent claim. Limitations in the independent claims may however provide a separate basis for patentability and the Examiner is respectfully urged to consider these as well, although they are not addressed in detail here below.

Claim 22

This claim has been amended to indicate that the process includes forming a phosphorous-containing metal oxide sol that has a dispersed phase with nano-clusters less than about 1000 nm in average size. While Ryang suggests some “micro-cluster” sizes, these are well below 1000 nm and in the “less than” 10, 5, and 2 nm range, and would not suggest sizes like 200 nm, which are yet “less than 1000 nm.” The polymer produced has phosphorous dispersed therein and is flame retardant. The phosphorous may of course be bound chemically to other chemical structure and is not limited to elemental phosphorous. The producing of this kind of phosphorous-containing polymer is not suggested in the cited combination of references.

Claim 38

In this claimed invention, the polymer material is contacted with the phosphinate metal oxide precursor prior to the at least partial hydrolyzing of the precursor. This step is not suggested or taught in the cited combination. Further, the sol has nano-clusters of at least 1000 nm which is also not suggested in the combination cited. While Ryang suggests some “micro-cluster” sizes, these are well below 1000 nm and in the ‘less than’ 10, 5, and 2 nm range, and would not suggest sizes like 200 nm, which are yet “less than 1000 nm.” The polymer produced has 0.1 to 50 wt % phosphorous-containing metal oxide dispersed therein and is flame

retardant. The producing of this kind of phosphorous-containing metal oxide concentration dispersed in a flame retardant polymer is not suggested in the cited combination of references.

Claim 52

This claim also contacts the polymer material with the phosphinate metal oxide precursor prior to the at least partial hydrolyzing of the precursor. This step is not suggested or taught in the cited combination. The produced polymer has a phosphorous-containing metal oxide concentration of about 0.5 to 30 wt% in nano-clusters of less than 1000 nm average size that are dispersed throughout the polymer. These concentrations, nano-cluster sizes and flame retardant properties are features neither taught nor suggested in the cited combination.

Claim 54

This claim contacts the polymer material with at least the dispersed phase of the phosphorous-containing metal oxide sol precursor after the at least partial hydrolyzing of the precursor. The produced polymer has a phosphorous-containing metal oxide concentration of about 0.5 to 30 wt% in nano-clusters of less than 1000 nm average size are dispersed throughout the polymer. These concentrations, nano-cluster sizes and flame retardant properties are features neither taught nor suggested in the cited combination.

CONCLUSION

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation to modify a reference or to combine the teachings of multiple references. Applicant does not here contest the combination as advanced by the Office Action, but reserves the right to do so. Second, there must be a reasonable expectation of success. This criterion is not met because neither of the references addresses the issue of flame retardation of polymers and so there is no basis for any expectation of success. Third, the prior art must teach or suggest all of the recited claim limitations. This is also not met because each of the claims has significant limitations not found in the cited combination of references. Of course, the teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in Applicant's disclosure.

Applicant respectfully submits that the Office Action does not meet all of the above criteria as to the now-pending claims.

In conclusion, for the reasons given above, all claims now presently in the application are believed allowable and such allowance is respectfully requested. Should the Examiner have any questions or wish to further discuss this application, Applicants request that the Examiner contact the undersigned attorney at (480) 385-5060.

If for some reason Applicants have not requested a sufficient extension and/or have not paid a sufficient fee for this response and/or for the extension necessary to prevent abandonment on this application, please consider this as a request for an extension for the required time period and/or authorization to charge Deposit Account No. 50-2091 for any fee which may be due.

Respectfully submitted,

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